



# Spectrum pricing for terrestrial broadcasting

Consultation on implementation

	Consultation
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# Contents

Section		Page
1	Executive summary	3
2	Introduction and background	8
3	The purpose of spectrum charges and their application for broadcasting	11
4	Revised proposals for spectrum fees in broadcasting	16
5	Consideration of the level of AIP and the manner of its introduction	24
<b>Annex</b>		<b>Page</b>
1	Responding to this consultation	27
2	Ofcom's consultation principles	29
3	Consultation response cover sheet	30
4	Consultation questions	32
5	Legal framework	33
6	Indicative AIP for future DTT spectrum use	36
7	Glossary of terms	41

## Section 1

# Executive summary

## Introduction

- 1.1 This consultation sets out revised policy proposals on the introduction of charges for radio spectrum used by terrestrial broadcast multiplex operators.
- 1.2 In principle, we believe that all users of spectrum should pay an appropriate charge for access to what is a scarce resource. The use of spectrum for terrestrial broadcasting is one of the few remaining areas where such charges have not yet been applied. In June 2007 we published a statement<sup>1</sup> setting out our conclusions on the application of a pricing mechanism to spectrum used for broadcasting. The statement said:
- Broadcasting use of spectrum should be subject to appropriate charges in the same way as other uses;
  - The right time to introduce charging for spectrum used for digital broadcasting – both television and radio – would be from the end of 2014 i.e. after digital switch-over (DSO) and the expiry of the initial terms of the existing digital terrestrial television (DTT) multiplex licences.
  - Before introducing any charges, we would consider carefully any potential effects on broadcasting output, and the right options to address or mitigate those effects.
- 1.3 This new consultation restates the principles underlying the application of spectrum charges; considers the basis on which those charges should be applied to spectrum used for broadcasting; and then discusses how an appropriate level of fees might be calculated.

## Our duties and their application

- 1.4 As the independent regulator for communications, we have a duty to secure optimal use of the radio spectrum. We interpret 'optimal use' to mean that spectrum is used in a way that maximises the value derived by citizens and consumers - including the wider social value of spectrum use, taking into account specific consumer and citizen interests.
- 1.5 We believe our objective is, as a general rule, more likely to be achieved if detailed decisions are left to those directly engaged in spectrum use, rather than dictated centrally by a regulator. We have therefore adopted a range of complementary regulatory instruments to manage the spectrum with less central direction by Ofcom - whilst recognising that regulation continues to play an important role in some areas. These areas include managing interference; negotiating international agreements to enable the better exploitation of spectrum for the UK; securing compliance with international obligations; and addressing market failures.
- 1.6 The regulatory instruments at our disposal include the setting of charges for use of spectrum. At the very least, we believe fees should cover the costs we incur in the

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<sup>1</sup> <http://stakeholders.ofcom.org.uk/consultations/futurepricing/statement/>

regulatory management of the spectrum. In most cases, it is appropriate for us to go further: we consider that we will typically achieve the optimal use of spectrum by setting charges at a level that reflects the opportunity cost of spectrum. We refer to the practice of setting charges which reflect opportunity cost as Administered Incentive Pricing (AIP).

- 1.7 The principle behind AIP is that the use of spectrum for any particular purpose imposes an opportunity cost on society. This cost is the value of the alternative uses of that spectrum that are denied access as a result. If users pay a charge which reflects opportunity cost, they have an incentive to use the spectrum they hold in the most efficient way or vacate it for a more valuable use. Our 2007 statement said we would apply AIP to the use of spectrum for broadcasting.
- 1.8 Our 2010 Strategic Review of Spectrum Pricing<sup>2</sup> (SRSP) set out a process for calculating an appropriate level for AIP. The first stage is to determine current and alternative uses for the particular spectrum. If there is excess demand for the spectrum, then AIP is applicable, and the next stage is to calculate the relevant opportunity cost. If there is no excess demand for the spectrum, then AIP is not applicable.
- 1.9 However, our SRSP consultation also noted that AIP was only one tool, and that in some cases it is appropriate to use other tools to achieve the overall aim of optimal use.

## **Spectrum charges for national DTT broadcasting**

- 1.10 We remain of the view that it is appropriate to apply charges to spectrum used for national DTT broadcasting. We therefore propose to proceed with the introduction of charges from the end of 2014. We have also considered further the basis on which those charges should be set i.e. whether AIP-based charges should apply or whether another pricing mechanism is more appropriate.
- 1.11 We continue to believe that it is appropriate, in principle, to set charges at AIP levels. However, for the reasons set out below, we propose at this stage only to introduce charges to cover the costs we incur in the regulatory management of the spectrum used for national DTT. We will introduce charges at AIP levels at a later date, once we have materially progressed our proposals for future use of the UHF spectrum. We would expect to introduce AIP by around 2020.
- 1.12 In order to inform the analysis which led us to these conclusions, we commissioned an independent consultancy, Analysys Mason, to assess the opportunity cost of spectrum used for broadcasting, using the process set out in the SRSP. The study<sup>3</sup> concluded that there was evidence of excess demand for spectrum currently used for national DTT. Under the principles of the SRSP, it would therefore be appropriate to apply AIP to spectrum used for national DTT broadcasting.
- 1.13 However, we then considered further whether AIP was the most appropriate pricing mechanism to be applied from the end of 2014, in light of likely changes to the environment affecting the use of spectrum by terrestrial television broadcasters. In this context, a critical question is whether AIP would achieve its objective of delivering greater efficiency of spectrum use, and particularly whether there would be scope for broadcasters to respond effectively.

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<sup>2</sup> <http://stakeholders.ofcom.org.uk/consultations/srsp/>

<sup>3</sup> <http://stakeholders.ofcom.org.uk/binaries/consultations/aip13/annexes/report.pdf>

- 1.14 We have examined the difference in potential efficiency gains between national DTT multiplex operators acting at an individual level compared to the gains achievable by co-ordinated approaches across the platform as a whole<sup>[2]</sup>. Our analysis suggests multiplex operators acting independently could only achieve very modest spectrum efficiency gains. In contrast, we estimate that actions involving a co-ordinated approach could result in efficiency gains of 600% or more.
- 1.15 In practice, broadcast multiplex operators have limited room for manoeuvre, for a number of interlinked reasons. First, they are subject to regulatory obligations imposed through licence conditions. These are designed by Ofcom to reflect our duties under the Communications Act to secure a wide range of television services throughout the whole of the UK and to promote, in particular, public service television. Second, there is a risk that an uncoordinated transition to more efficient transmission technologies would leave significant numbers of consumers with obsolete receiver equipment to the detriment both of those using the DTT platform and to the reach of public service content. Third, broadcasters' use of particular spectrum frequencies in the UK is dependent on internationally agreed co-ordination because of the need to avoid cross-border interference.
- 1.16 These factors do not absolutely prevent broadcasters from seeking to deliver efficiency improvements, but they collectively make it more challenging. However, there is also a wider context stemming from the decision by the World Radio-communications Conference 2012 (WRC12) to signal the potential use of the 700 MHz spectrum band for mobile broadband. This spectrum is one of the bands currently used for television broadcasting but, as a result of WRC12, is now expected to become harmonised throughout Europe under a 'co-primary' allocation for use by mobile.
- 1.17 In November 2012 we set out our UHF Strategy<sup>[3]</sup> in which we said we would support the international process and seek to enable a harmonised release of additional low frequency spectrum (i.e. the 700 MHz band) for mobile broadband, whilst seeking to ensure the DTT platform could access alternative UHF spectrum frequencies in the neighbouring 600 MHz band.
- 1.18 If DTT operators were to start using frequencies in the 600 MHz band as part of the wider DTT network, and stop using frequencies in the 700 MHz band, there would need to be a comprehensive re-planning of the DTT multi-frequency network (MFN), involving significant co-ordination between multiple stakeholders both in the UK and internationally. Moreover, in order to achieve a successful transition, multiplex operators would need to use the frequencies more efficiently due to the smaller amount of spectrum available to them.
- 1.19 It is not yet clear when and how the transition of DTT out of the 700 MHz spectrum band might happen, but in such an environment it seems unlikely that broadcasters would respond effectively to the price signals provided by AIP. On the other hand, a co-ordinated approach to transition is likely to deliver significant efficiency benefits regardless of any application of AIP.
- 1.20 This is a unique combination of circumstances, and one in which we do not expect the application of AIP to meet its core objective of securing the optimal use of

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<sup>[2]</sup> Our analysis is included in Section 4 of this document

<sup>[3]</sup> "Securing long term benefits from scarce low frequency spectrum, UHF strategy statement"  
[http://stakeholders.ofcom.org.uk/binaries/consultations/uhf-strategy/statement/UHF\\_statement.pdf](http://stakeholders.ofcom.org.uk/binaries/consultations/uhf-strategy/statement/UHF_statement.pdf)

spectrum. We therefore consider that it would not be appropriate to introduce AIP for terrestrial television broadcasting at this stage.

- 1.21 In the short term, we propose to apply a regulatory pricing mechanism to recover our on-going costs in managing the spectrum (including the costs connected to the operation of the licensing regime). In line with the principles set out in the SRSP, we believe it is appropriate that the costs of managing spectrum used for broadcasting are borne by broadcasters benefitting from use of the spectrum, and that non-broadcast users of spectrum do not pay a disproportionate share of management costs. We will consult on cost-based spectrum management charges later this year (2013).
- 1.22 Longer term - once there is greater ability for multiplex operators to respond to pricing incentives – we intend to set AIP-based charges. We will do so once we have materially progressed our proposals for the future use of the UHF spectrum. At that time, the charges will be adjusted to AIP, based on the full opportunity cost of the spectrum. We do not currently anticipate that this will occur until after 2018, although we would expect to introduce AIP by around 2020.
- 1.23 When applying AIP charges to other bands of spectrum, we have usually phased in payments over a number of years. This is because the introduction of fees of significant levels over a short period of time can lead to inefficient decisions about inputs and outputs, and therefore a sub-optimal use of spectrum. Consequently, our working hypothesis is that we would adopt a phased approach to the imposition of AIP for spectrum used by national DTT multiplexes.

## **DAB Radio and Local TV broadcasting**

- 1.24 As with national DTT broadcasting, we remain of the view that it is appropriate to apply the principles of charging for spectrum used by DAB radio and for local TV broadcasting. We will therefore introduce charges to recover our ongoing costs of spectrum management from those users and will consult on the level of those charges later this year.
- 1.25 In line with our 2007 statement, we considered whether the level of charges for DAB radio and local TV broadcasting should be set at AIP levels. However:
  - The study conducted by Analysys Mason indicates there is no excess demand for spectrum deployed for secondary, interleaved use by local TV. AIP is therefore not applicable for local TV broadcasting.
  - In the spectrum bands assigned for DAB radio, there is excess capacity at present and therefore no evidence of excess demand. As for local TV, AIP is therefore not applicable.
- 1.26 Accordingly, we do not propose to apply AIP to either DAB radio or to local TV broadcasting from 2014.

## **Longer term application of AIP to national DTT**

- 1.27 We believe our proposals to delay the introduction of AIP for national DTT broadcasting remove considerable uncertainty for broadcasters in the short term. However, as explained above, in the longer term we do expect to introduce AIP-based charges and we recognise that uncertainty about the eventual level of charges remains. To minimise that uncertainty, we have considered now both the

possible level of AIP-based charges and the manner in which they might be introduced.

- 1.28 In a scenario in which the 700 MHz band has been harmonised for mobile use after 2018 and the DTT multiplexes are operating in the remaining DTT UHF spectrum, including the 600 MHz band, the indicative AIP on national DTT broadcasters thereafter would be around £10 million per multiplex per annum (at 2020 prices).
- 1.29 If harmonisation of the 700 MHz band occurs and the DTT multiplexes continue to operate in the 700 MHz band, AIP would be of the order of £40 million per multiplex per annum. We would expect to introduce AIP gradually over a period of 5 years to avoid imposing a sudden additional cost on national DTT broadcasters.

## **Our duties to broadcasting**

- 1.30 In our 2007 statement, we gave a commitment that we would consider both the potential effects of AIP on broadcast content, and the steps available to mitigate those effects, before applying AIP – particularly in regard to public service broadcasting (PSB). We believe this position remains valid for when we consider the imposition of AIP for the use of spectrum by television broadcasting. However, in light of the arguments set out above in support of applying AIP-based charges only in the longer term, we have not considered at this stage the potential impact of AIP on broadcast content.

## Section 2

# Introduction and background

- 2.1 The purpose of this consultation is to set out revised policy proposals on the introduction of charges for radio spectrum used by broadcast multiplex operators. It restates the principles underlying the application of spectrum charges; considers the basis on which those charges should be applied; and then discusses how an appropriate level of fees might be calculated.
- 2.2 Ofcom is responsible for the management of all spectrum used for wireless communications in the UK. Section 3(2)(a) of the Communications Act sets out our requirement to secure “*the optimal use for wireless telegraphy of the electromagnetic spectrum*” for the benefit of citizens and consumers.
- 2.3 We interpret ‘optimal use’ to mean that spectrum should be used in a way that maximises the value derived by citizens and consumers – including the wider social value of spectrum use, taking into account specific consumer and citizen interests.
- 2.4 We believe our objective is, as a general rule, more likely to be achieved if detailed decisions are left to those directly engaged in spectrum use, rather than dictated centrally by a regulator. We have therefore adopted a range of complementary regulatory instruments to manage the spectrum with less central direction by Ofcom – whilst recognising that regulation continues to play an important role in some areas. These include managing interference; negotiating international agreements to enable the better exploitation of spectrum for the UK; securing compliance with international obligations; and addressing market failures.
- 2.5 We conducted an initial consultation on the application of charges to spectrum used by broadcasters in July 2006. In June 2007 we published a statement setting out our conclusions as follows:
- broadcasting use of spectrum should be subject to appropriate charges in the same way as other uses;
  - the right time to introduce charging for spectrum used for digital broadcasting – both television and radio – is from the end of 2014;
  - before actually introducing any charges, we would consider carefully any potential effects on broadcasting output, and the right options to address or mitigate them.
- 2.6 These conclusions have been taken into account in various broadcasting and other policy reviews carried out in the meantime, including our statutory reviews of Public Service Broadcasting<sup>4</sup>; our review on the Future of Radio<sup>5</sup>; our Financial Review of Channel 4<sup>6</sup>; and our submissions on the Re-licensing of Channel 3 and Channel 5<sup>7</sup>.

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<sup>4</sup> <http://stakeholders.ofcom.org.uk/broadcasting/reviews-investigations/public-service-broadcasting/>

<sup>5</sup> <http://stakeholders.ofcom.org.uk/consultations/futureradio/>

<sup>6</sup> <http://stakeholders.ofcom.org.uk/broadcasting/reviews-investigations/public-service-broadcasting/c4review/>

<sup>7</sup> <http://stakeholders.ofcom.org.uk/broadcasting/tv/licensing-c3-c5/>

- 2.7 With the 2014 date for introducing charges for broadcast spectrum now approaching, we believe it is important to consider whether the manner and timing of their introduction determined in the 2007 statement remains appropriate. This consultation addresses these issues and assesses the options available.

## Impact Assessment

- 2.8 The consultation as a whole, together with its Annexes, represents an impact assessment, as defined in section 7 of the Communications Act 2003.
- 2.9 Impact assessments provide a valuable way of assessing different options for regulation and showing why the preferred option was chosen. They form part of best practice policy-making. The consultation sets out the reasons for our policy proposals and the potential impacts on stakeholders.
- 2.10 In particular, we consider the potential impact on stakeholders of proceeding with the introduction of charges from the end of 2014, as determined in the 2006/7 consultation and statement. This further consultation does not seek to re-consider the underlying principle of applying charges to broadcast spectrum. The impact on stakeholders in that regard was assessed in full through the earlier consultation process. Instead, this consultation considers the impact of putting into practice those underlying policy decisions on the original timescale.

## Equality Impact Assessment

- 2.11 Ofcom is separately required by statute to assess the potential impact of all our functions, policies, projects and practices on race, disability and gender equality. Equality Impact Assessments (EIAs) also assist us in making sure that we are meeting our principal duty of furthering the interests of citizens and consumers regardless of their background or identity.
- 2.12 It is not apparent to us that the outcome of our proposed approach to the application of charges to spectrum used for broadcasting is likely to have any particular impact on race, disability or gender equality. Specifically, we do not envisage the impact of any outcome to be to the detriment of any particular group of society.
- 2.13 Nor have we seen the need to carry out separate EIAs in relation to race or gender equality or equality schemes under the Northern Ireland and Disability Equality Schemes. This is because we anticipate that our proposals will affect all stakeholders equally and will not have a differential impact in Northern Ireland in relation to people of different groups or to gender; ethnicity, or disability, compared to consumers in general.

## Structure of this document

- 2.14 The rest of this document sets out our further consideration of the introduction of charges for broadcast multiplex operators from the end of 2014 (national DTT, local DTT, and DAB radio), and so re-examines whether decisions taken in 2007 on the timing of its application remain valid.
- Section 3 examines the purpose and principles behind spectrum charges - and AIP in particular; how those principles apply to spectrum used for broadcasting;

the reasons we adopted our original approach to applying charges; and how charges are calculated.

- Section 4 examines the changes to the broadcast environment which have a subsequent impact on the earlier decisions; sets out our analysis of the options we have considered for introducing charges for broadcasters; and spells out our revised proposals;
- Section 5 sets out our current analysis of the manner and level of AIP that might apply to broadcast use of spectrum in the future.

## Section 3

# The purpose of spectrum charges and their application for broadcasting

## Introduction

- 3.1 This section of the consultation sets out the principles and purposes that underpin the development of our policies on spectrum charges, and on AIP in particular.
- 3.2 We consider how charges can encourage efficient use of spectrum, and why it is as relevant for broadcasting use of spectrum as it is for other uses. In doing so, we set out the reasons for reaching the conclusions on spectrum charges for broadcasting contained in our 2007 statement. Finally, we consider how AIP based on opportunity cost is calculated.

## The principle of spectrum charging

- 3.3 Ofcom has a duty to ensure that optimal use is made of the electro-magnetic spectrum, for the benefit of UK citizens and consumers. The regulatory instruments at our disposal include the setting of charges for use of spectrum. At the least, as set out in the SRSP, we believe fees should cover the costs involved in regulatory management of the spectrum. It is appropriate that these costs fall on the party which benefits from use of the spectrum. In most cases, we set spectrum charges above this minimum level to reflect the opportunity cost of spectrum. We refer to setting charges that reflect opportunity cost as Administered Incentive Pricing (AIP). Our 2007 statement said we should apply AIP to terrestrial broadcasting.
- 3.4 Spectrum is a major asset to the UK economy and society. It is the means by which all wireless communications devices operate and is critical to areas such as radio and television broadcasting, air travel, emergency services, cellular telephony, mobile multimedia and public utilities.
- 3.5 The amount of spectrum available in the UK is limited. It is therefore important that all users of spectrum are encouraged to make the most efficient use possible of the spectrum they hold. Spectrum use itself is exclusionary as the use of spectrum for one purpose generally precludes its use for another and therefore imposes an opportunity cost i.e. the value of the lost opportunity to use the spectrum for an alternative purpose.
- 3.6 We believe, in general, that decisions affecting current and future spectrum use should be made with a full and accurate understanding of the opportunity cost that such use imposes. This provides the basis for AIP - annual fees that reflect the opportunity cost of holding spectrum.
- 3.7 The charging of fees is one way in which we can encourage current and prospective spectrum users to make the right decisions to ensure efficiency. An existing licence holder may be incentivised to vacate the spectrum in favour of a more valuable use. Alternatively, the spectrum holder may be incentivised to use the spectrum it holds in the most efficient way possible to extract the maximum value in 'own use'.

- 3.8 The application of AIP is not designed to achieve any particular change in spectrum use, in either the short or long term. The objective in applying AIP is simply to ensure that the market has the right signals to ensure that decisions taken are in the best interests of UK citizens and consumers.
- 3.9 It is also important to note that our SRSP consultation document made it clear that AIP fees are only one tool that we use to manage spectrum and that in some cases it is appropriate for us to use other tools, such as intervention, to achieve our overall aim of optimal use of spectrum. The consultation said: *“Where there is a clear case for re-allocating spectrum quickly from a low value use to a higher value use, because the benefits of such a change and our confidence in the outcome is high, we would normally look to intervene and clear the band in a planned manner rather than looking to price to effect such a change”*.

### **Application of AIP for broadcasting**

- 3.10 Unlike many other spectrum holders, broadcast multiplex operators have had access to spectrum until now without having to pay fees (either annual fees or through acquisition of spectrum via auction). In July 2006, we consulted on proposals to implement charges on the spectrum used for terrestrial broadcasting - i.e. through charges on operators of multiplexes for DTT and for DAB radio. In considering the options, we addressed the question of whether the general principle of AIP applied in the same way to broadcasting as it does to other uses.
- 3.11 Our consultation explicitly recognised Ofcom’s role as a converged regulator for communications in the UK, with duties encompassing both broadcasting and spectrum management. We said we needed to adopt a holistic approach and that we should not be constrained to think about spectrum management only. Instead, we should consider what might be the best way of simultaneously achieving both spectrum management and broadcasting policy objectives.
- 3.12 The broadcast multiplex operators argued in their consultation responses that AIP was inappropriate for them because they were unable to respond to pricing incentives. In particular, they pointed to specific terms in their licences, set and enforced by Ofcom. These included detailed DTT coverage obligations.
- 3.13 They also raised concerns about the detrimental effects of spectrum charges on broadcasting content, and said reduced programme budgets would be undesirable for citizens and/or consumers. This was because broadcasting in general, and certain types of broadcasting in particular (e.g. PSB television) generated value for society in excess of the value to the individual broadcaster.
- 3.14 We considered these points and concluded that:
- there are considerable incentive benefits from introducing price signals associated with spectrum use, that apply to broadcasting use as much as to any other use;
  - spectrum users – and Ofcom, and Government – can respond, albeit over the longer term, to the incentives created by AIP. AIP has the potential not only to incentivise more efficient behaviour by spectrum users, but more efficient decision-making by regulators too;

- a range of ways exists to mitigate any detrimental effects on consumers or citizens. There is considerable time available for spectrum users and others to identify potential effects and consider a response.
- 3.15 We therefore concluded in our statement of June 2007 that spectrum used for digital broadcasting should be subject to the same kind of charges that apply to other users.
- 3.16 However, we made it clear, in light of our duties in relation to broadcasting, that we would consider the potential impacts on content and the right options to address or mitigate them before charges were introduced. In relation to PSB output we said our options could include not introducing charges in the form of AIP, or levying it at a reduced rate.

## Timing of charges for broadcasting

- 3.17 The 2007 statement said the right time to introduce charging for spectrum used for digital broadcasting would be the end of 2014. This decision acknowledged that it was not appropriate to introduce AIP-based charges on national DTT multiplex holders during the process of television DSO. We considered that the key to more efficient use of spectrum in the UHF bands IV and V at that time was DSO itself, and there was no need for the additional imposition of AIP.
- 3.18 The 2007 decision to apply charges to broadcast use of spectrum only after the end of 2014 meant its introduction would not only follow the end of DSO (completed in 2012) but also coincide with the end of licence terms for the three latest expiring DTT multiplexes (2014).<sup>8</sup>
- 3.19 The statement concluded that charges for DAB radio broadcasting should also be introduced from the end of 2014.

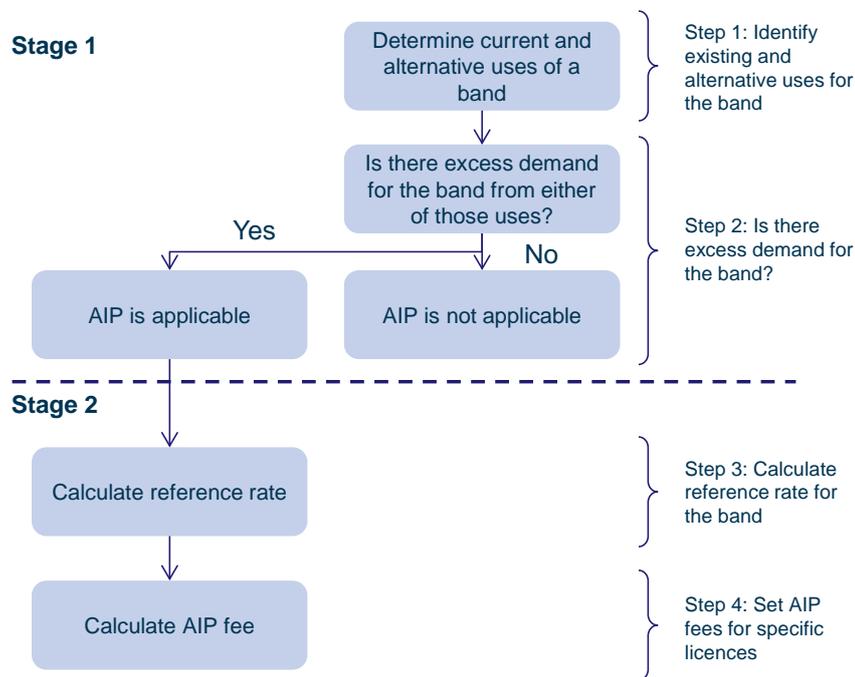
## How AIP is calculated

- 3.20 To set an appropriate level for AIP, we calculate the opportunity cost of spectrum use. We follow a two stage process, as set out in the SRSP (see Figure 1 below).
- 3.21 If there is no excess demand for the particular spectrum, there is no opportunity cost and there is therefore no need for AIP to be applied. The first stage of calculation is therefore to establish whether the spectrum is a scarce resource in a particular band. This involves answering three key questions:
- Is the spectrum currently (or does it seem likely to become) heavily congested under its current own use?
  - If the spectrum is not congested, is this due to an artificial limiting factor (e.g. licence restrictions)?
  - Is there a realistic alternative use of the spectrum, and if so, is there excess demand from any of these alternative uses?

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<sup>8</sup> There are currently six national DTT multiplexes in operation. In addition there is a DTT multiplex in Northern Ireland to carry services from the Republic of Ireland as part of the Irish Good Friday Agreement. From 2013 there will also be a DTT multiplex carrying local TV services to main population centres in the UK.

**Figure 1 Process for setting AIP**



Source: Ofcom Strategic Review of Spectrum Pricing, 2010

3.22 If there is excess demand from both existing and alternative uses, the calculation of opportunity cost involves consideration of the value of the spectrum both in ‘own use’ (i.e. the most efficient use of spectrum for broadcasting) and in ‘alternative use’ (the next most valuable alternative use).

3.23 Our 2010 consultation on spectrum pricing<sup>9</sup> noted (paragraphs 4.14 and 4.18) that:

*‘value in existing use’ or ‘existing use opportunity cost’ – [is] the value that an average user in the current use of the band (or bands) attaches to a small additional block of spectrum in the band, which measures the marginal value of that spectrum in its existing use;*

*To estimate the opportunity cost of spectrum we currently primarily use the ‘least cost alternative’ (LCA) method. This involves estimating the value to an average user of a small additional block of spectrum in the band, in terms of avoided cost. This is generally based on a study of the cost of long-term alternative network designs or technology choices that would be made in response to a small reduction in spectrum held by a user. Importantly the LCA method looks at the choices that would be made in long-term, rather than short-term. In the short-term users’ responses would usually be more limited and more costly.*

3.24 In the case of DTT broadcasting, assessing ‘own use’ opportunity cost involves making an assessment of the ways in which DTT multiplex operators might respond to a loss of some spectrum. These responses might include the adoption of more

<sup>9</sup> [http://stakeholders.ofcom.org.uk/binaries/consultations/srsp/summary/srsp\\_condoc.pdf](http://stakeholders.ofcom.org.uk/binaries/consultations/srsp/summary/srsp_condoc.pdf)

efficient transmission technologies (such as DVB-T2 with MPEG4 compression for DTT). Assessing 'alternative use' involves a theoretical calculation of the value which might be placed on the spectrum if it were used for a different purpose.

- 3.25 We commissioned Analysys Mason consultancy to calculate the opportunity cost of spectrum currently used for broadcasting using both of these methods. Our current assessments of AIP based on these calculations are discussed more fully in Section 5.

## Section 4

# Revised proposals for spectrum fees in broadcasting

- 4.1 In the previous sections we have set out a summary of the rationale for applying fees for the use of spectrum. We have also set out the reasons behind the decision taken in 2007 to apply such fees to spectrum used for broadcasting from the end of 2014.
- 4.2 In this section, we consider why recent and prospective changes to the broadcasting environment mean it is appropriate for us to review the approach to charges set out in our 2007 statement. We examine in particular the issues we need to consider before proceeding – or not – with the application of AIP from the end of 2014 to spectrum used for broadcasting. We then present our revised proposals on the introduction of spectrum charges for consultation. Our conclusions are that:
- We should introduce spectrum charges for spectrum used for terrestrial broadcasting from the end of 2014;
  - At that stage, those charges should be set to recover the costs we incur in the regulatory management of that spectrum; and
  - Once we have materially progressed our proposals for the future use of the UHF spectrum we will transition the charges for the national DTT multiplexes to AIP levels. We would expect to introduce AIP by around 2020.
- 4.3 Our considerations focus mainly on issues affecting spectrum used for national DTT multiplexes. We address charges for DAB radio and local TV separately towards the end of this section.

## The continuing relevance of spectrum charging

- 4.4 Our 2007 statement confirmed our view that we should set charges for the use of broadcast spectrum, and that those charges should be set at levels to reflect opportunity cost – i.e. that we should apply AIP.
- 4.5 As discussed in more detail in the previous section, the use of spectrum for terrestrial broadcasting imposes opportunity costs on society in the same way as spectrum used for any other purpose – i.e. the value lost to society of the alternative uses that are denied access to that spectrum.
- 4.6 Our 2006 consultation said that by charging AIP for broadcast use of spectrum, we would ensure that the opportunity costs were properly reflected when broadcasters made decisions that could affect future spectrum use – not only decisions about the allocation, assignment and continued holding of spectrum, but also decisions about related matters, such as investment in research and in the development of more efficient technologies.
- 4.7 There are a number of inputs for which broadcasters must pay in the course of running their businesses. In principle, if the value of one input e.g. spectrum is not reflected through pricing, it could lead to inefficient decisions being made about its use and the use of other inputs.

- 4.8 Broadcasters individually and collectively may face a number of decisions that could affect future spectrum demand and use. For DTT these include:
- How to make best use of existing DTT capacity, including decisions about picture quality (and bit rate) and intensity of capacity use (degree of statistical multiplexing);
  - What investment to make in the development and deployment of new technologies that might make better use of capacity such as new coding techniques like DVB-T2, MPEG4 and, over a longer time frame, HEVC; and
  - Whether to adopt formats that require additional capacity, such as HDTV.
- 4.9 If the outcome of these and other decisions is to be in the best interests of citizens and consumers in the UK, they need to be taken with a full appreciation of the opportunity cost of spectrum. We remain of the view that applying AIP to the holding of spectrum for broadcasting purposes, in the same manner it is already applied to many other uses of spectrum in the UK today, is one of the best ways of ensuring this outcome.
- 4.10 We therefore believe there is no reason to change the core conclusion of our 2007 statement that charges should be applied to spectrum used for broadcasting and that those charges should, in principle, be set at AIP levels.

### **Introduction of spectrum charges to national DTT multiplexes**

- 4.11 In line with the principles set out in the SRSP and our 2007 statement, we propose to introduce charges for the spectrum used for national DTT multiplexes. At the very least, these charges should recover the costs we incur in regulatory management of this spectrum. Failure to set charges at these levels would mean that non-broadcast users would make a disproportionate contribution to our spectrum management costs.
- 4.12 We have considered whether it would be appropriate, from the end of 2014, to set charges above this minimum level, and specifically whether we should apply AIP to national DTT multiplexes. As already indicated, we commissioned an independent consultancy, Analysys Mason, to assess the opportunity cost of spectrum used for broadcasting using the process described in the SRSP (see Section 3). The Analysys Mason study concluded there was evidence of excess demand for spectrum currently used for national DTT. Given that there is this excess demand, and in accordance with the principles set out in the SRSP, it would therefore be appropriate to impose AIP in respect of the use of that spectrum.
- 4.13 However, we then considered further whether AIP was the most appropriate pricing mechanism to be applied from the end of 2014, in light of likely changes to the environment affecting the use of spectrum by national DTT broadcasters. In this context, we considered whether AIP would achieve its objective of delivering greater efficiency of spectrum use, and particularly whether there would be scope for broadcasters to respond effectively.
- 4.14 AIP is intended to create on-going (long term) incentives for efficient use of spectrum. In publications since the 2007 statement, including the SRSP, we have consistently emphasised this long term nature of the pricing incentives.

- 4.15 The 2007 decision to apply AIP to broadcast use of spectrum only after 2014 meant its introduction would follow the end of DSO in television (completed in 2012) and coincide with the end of licence terms for the three latest expiring DTT multiplexes (2014). This recognised that the greatest efficiency changes would stem in the meantime from regulatory action through DSO, and not as a result of incentive pricing.
- 4.16 At the time, it was anticipated that broadcast multiplex operators would, by 2014, be operating under new long-term licences with certainty of tenure over their spectrum holdings. In those circumstances, it would be possible to set an appropriate and consistent level of annual AIP for the remainder of their new licence periods. AIP would then serve as an incentive for broadcasters to use the spectrum as efficiently as possible and/or free up spectrum for more valuable uses.
- 4.17 Figures 4.2 and 4.3 below set out an indicative assessment of the potential efficiency gains that national DTT users of spectrum might, in theory, be able to achieve. Although the figures are estimates – and by their nature approximate – they demonstrate the low level of efficiency gains achievable by national multiplex operators acting independently, compared to the much larger gains possible through co-ordinated approaches. They indicate that multiplex operators acting independently have little scope to achieve efficiencies. There is far greater scope through co-ordinated action.

**Figure 4.1 Spectrum efficiency gain options for PSB multiplex operators**

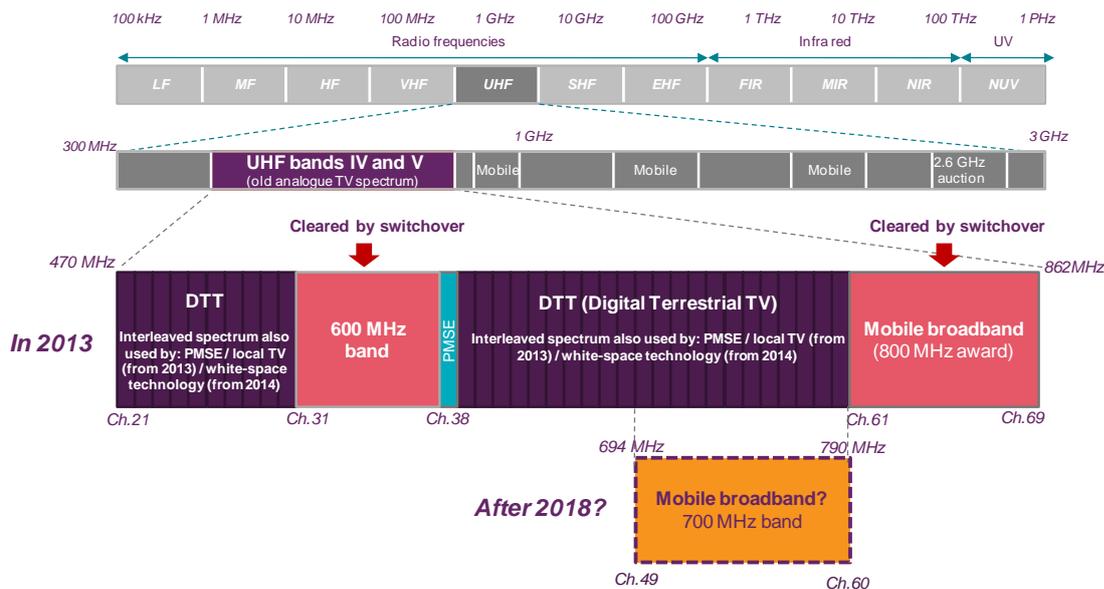
<b>Spectrum efficiency approach</b>	<b>Estimated potential multiplex efficiency gain (%)</b>	<b>Potential timing</b>	<b>Can be made at a multiplex level without wider platform considerations</b>	<b>Comments</b>
<b>1. Reduce programme bit rate</b>	<b>Up to 3%</b>	<b>Now</b>	<b>Yes</b>	Any significant reduction in PSB programme bit rates is likely to impact on picture quality and hence the overall attractiveness of the DTT platform. Ofcom's Technical Performance Code requires the PSB channels to provide a minimum quality level.
<b>2. Use latest MPEG 2 compression transmission equipment</b>	<b>Up to 5%</b>	<b>Now</b>	<b>Yes</b>	No impact on PSB picture quality or need for new receivers. Actual level of potential efficiency gains is dependent on type of MPEG 2 coder used by the PSB multiplexes to day.
<b>3. Reduce multiplex error correction</b>	<b>12.5%</b> (Reduce coding rate from 2/3 to 3/4)	<b>Now</b>	<b>No</b>	Approximately 1 to 2% of households likely to lose PSB coverage. This would mean that the PSB multiplexes are unable to meet their public policy related licence obligations to provide 98.5% household coverage.
<b>4. SD rather than HD on HD PSB mux</b>	<b>200%</b>	<b>Now</b>	<b>No</b>	An SD only DTT platform could become less attractive to consumers, undermining its future viability as a platform. Likely to result in a slower platform transition to more efficient DVB T2 and MPEG 4 technologies
<b>5. Use MPEG-4 and DVB-T2 rather than MPEG-2 and DVB-T</b>	<b>330%</b>	<b>Post 2020</b>	<b>No</b>	Timing of adoption on PSB multiplexes likely to be set by the need for late adopters to purchase DVB T2/ MPEG 4 receivers to be able to continue to access the core PSB channels, and as such has an associated public policy dimension.
<b>6. Use of HEVC and DVB-T2 on MPEG2/DVB-T muxes</b>	<b>590 to 660%</b>	<b>Post 2020</b>	<b>No</b>	Timing of adoption on PSB multiplexes likely to be set by need for late adopters to purchase DVB T2/ HEVC receivers to be able to continue to access the core PSB channels, and as such has an associated public policy dimension.  The HEVC standard has only recently been finalised and there are currently no mass market receivers available.
<b>7. Use SFNs rather than MFNs</b>	<b>600%</b>	<b>Post 2030</b>	<b>No</b>	Would require a radical re-negotiation of European frequency assignments and re-plan of the DTT transmitter network.  New consumer aerials required. Unable to support regional or Nations programmes. Requires use of DVB-T2 on all muxes.

**Figure 4.2 Spectrum efficiency gain options for commercial multiplex operators**

<b>Spectrum efficiency approach</b>	<b>Potential multiplex efficiency gain (%)</b>	<b>Potential timing</b>	<b>Can be made at a mux level without wider platform considerations</b>	<b>Comments</b>
<b>1. Reduce programme bit rate</b>	<b>Up to 3%</b>	<b>Now</b>	<b>Yes</b>	Commercial mux programme bit rates are already generally lower than those used on the PSB muxes and any significant further reductions in bit rate are likely to result in severe picture distortions such as picture blockiness.
<b>2. Use latest generation of MPEG 2 compression Tx equipment</b>	<b>Up to 5%</b>	<b>Now</b>	<b>Yes</b>	No impact on picture quality or need for new receivers. Actual level of achievable efficiency gains is dependent on type of MPEG 2 coder used by the different commercial muxes to day.
<b>3. Use of MPEG-4 and DVB-T2 rather than MPEG-2 and DVB-T</b>	<b>330%</b>	<b>Post 2018</b>	<b>No</b>	Only viewers with DVB T2/MPEG 4 receivers would be able to continue to access commercial mux channels. Commercial multiplex operators decisions on when to transition to DVB T2/MPEG 4 are likely to be dictated by the consumer take-up of compatible receivers, which determines the reach of their services.
<b>4. Use of HEVC and DVB-T2 rather than MPEG-2 and DVB-T</b>	<b>590 to 660%</b>	<b>Post 2020</b>	<b>No</b>	Only viewers with DVB T2/HEVC receivers able to continue to access comm mux channels. Commercial multiplex operators decisions on when to transition to DVB T2/HEVC are likely to be dictated by the consumer take-up of compatible receivers, which determines the reach of their services. The HEVC standard has only recently been finalised and there are currently no mass market receivers available.
<b>3. Increased use of SFNs</b>	<b>10 to 20%</b>	<b>Post 2018</b> (after 700 MHz release)	<b>No</b>	Could be potentially implemented as part of the re-plan of the DTT platform needed to release the 700 MHz spectrum. Unable to support regional or Nations programmes.
<b>6. SFN only operation</b>	<b>600%</b>	<b>Post 2030</b>	<b>No</b>	Would require a radical re-negotiation of European frequency assignments and re-plan of the DTT transmitter network. New consumer aerials required. Unable to support regional or Nations programmes. Requires use of DVB-T2 on all muxes

- 4.18 In this context, we recognise that to some extent, broadcast multiplex operators have less room for manoeuvre than other users of spectrum for a number of interlinked reasons. First, they are subject to regulatory obligations imposed through licence conditions. These are designed by Ofcom to reflect our duties under the Communications Act to secure a wide range of television services throughout the whole of the UK and to promote, in particular, public service television (PSB). Second, there is a risk that an uncoordinated transition to more efficient transmission technologies would leave significant numbers of consumers with obsolete receiver equipment to the detriment both of those using the DTT platform and to the reach of public service content. Third, broadcasters' use of particular spectrum frequencies in the UK is dependent on internationally agreed co-ordination because of the need to avoid cross-border interference.
- 4.19 These factors do not absolutely prevent broadcasters from seeking to deliver efficiency improvements, but they collectively make it more challenging.
- 4.20 There is also a wider context stemming from a decision by the World Radio-communications Conference 2012 (WRC12) to signal the potential use of the 700 MHz spectrum band for mobile broadband. This spectrum is one of the bands currently used for television broadcasting but, as a result of WRC12, is now expected to become harmonised throughout Europe under a 'co-primary' allocation for use by mobile. A representation of the full range of UHF spectrum frequencies currently used for national DTT is set out below in figure 4.3.

**Fig 4.3 Current arrangement of UHF spectrum bands IV and V**



- 4.21 Our UHF Strategy consultation, and the associated statement published on 16 November 2012, set out our long term objectives for UHF bands IV and V. We explained our aim to secure the dual objectives of providing more low frequency spectrum for mobile broadband whilst also securing the ongoing delivery of the benefits provided by DTT. Specifically we stated that we will support an international process to seek harmonised release of the 700 MHz band for mobile broadband. At the same time, we would seek to ensure that the DTT platform can access the 600 MHz band, in the event that the 700 MHz band is made available for use by mobile broadband services.
- 4.22 If DTT operators were to start using frequencies in the 600 MHz band as part of the DTT network and stop using frequencies in the 700 MHz band there would be a need for comprehensive re-planning of the DTT multi-frequency network (MFN), involving significant coordination between multiple stakeholders. Internationally, there would be a need to agree new frequency plans. Within the UK, there would need to be a re-planning of the existing DTT multiplexes to make the transition happen.
- 4.23 In order to achieve a transition, multiplex operators will need to use the frequencies more efficiently, because the 600 MHz spectrum band is smaller than the 700 MHz band which will be released. They will also need to use the frequencies more efficiently if they are to deliver a greater range of high definition channels. Achieving the best outcome for citizens and consumers may well require a managed process. Final decisions on the timing and the nature of any transition of DTT from the 700 MHz to the 600 MHz band have not yet been taken. However, we do not anticipate implementation could happen before 2018.
- 4.24 A managed process is likely to deliver significant efficiency benefits regardless of any application of AIP. Indeed, it is unclear that any additional efficiencies could be realised as a direct consequence of the imposition of AIP in the short to medium term.
- 4.25 This is a unique combination of circumstances and one in which the application of AIP is unlikely to meet its core objective of securing the optimal use of spectrum. We

therefore consider that it would not be appropriate to introduce AIP for terrestrial television broadcasting at this stage.

## Revised proposals on spectrum charges for national DTT broadcasting

- 4.26 It remains an important principle that use of a valuable and scarce resource like spectrum should be subject to appropriate charges. These charges should recover the costs we incur in regulatory management of the spectrum, and, in principle, should also reflect the opportunity cost of the spectrum. Accordingly:
- We will introduce spectrum charges on national DTT broadcasting from the end of 2014. We will consult further on cost-based spectrum charges later this year (2013). However, we have already applied the principle in our proposals on the interim award of the 600 MHz spectrum band<sup>10</sup>; and
  - We see no reason to revise our approach to the *principle* of applying AIP, as set out in the 2007 statement.
- 4.27 As set out above though, a clearance of DTT from the 700 MHz spectrum – and the relocation of services to the 600 MHz band – would entail a re-organisation of the DTT platform and a complex transition. This would involve a co-ordinated process, and create a set of circumstances in which there would be little scope for the broadcasters to deliver efficiency improvements in response to the pricing incentives of AIP. As a result, we do not – for now – propose to apply full AIP-based charges.
- 4.28 In the short term, we propose to apply a regulatory pricing mechanism to recover our on-going costs in managing the spectrum (including the costs connected to the operation of the licensing regime). In line with the principles set out in the SRSP, we believe it is appropriate that the costs of managing spectrum used for broadcasting are borne by broadcasters benefitting from use of the spectrum, and that non-broadcast users of spectrum do not pay a disproportionate share of management costs. We will consult on cost-based spectrum management charges later this year (2013).
- 4.29 Longer term - once there is greater ability for multiplex operators to respond to pricing incentives – we intend to set AIP-based charges. We will do so once we have materially progressed our proposals for the future use of the UHF spectrum. At that time, the charges will be adjusted to AIP, based on the full opportunity cost of the spectrum. We do not currently anticipate that this will occur until after 2018, although we would expect AIP to be in place by around 2020.
- 4.30 At that time, we anticipate a more stable environment for the DTT platform – although this cannot be guaranteed – and that multiplex operators will be better able to respond to pricing incentives. In this way, we will ensure that broadcasters are appropriately incentivised as to their use of spectrum over the remainder of the next licence period.

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<sup>10</sup> <http://stakeholders.ofcom.org.uk/consultations/600mhz-award/> N.B. The figure proposed for cost based fees for the 600 MHz spectrum is based on a short-term DTT licence for a minimal number of transmission sites with limited UK coverage

## **DAB Radio and Local TV broadcasting**

- 4.31 As with national DTT broadcasting, we remain of the view that it is appropriate to apply the principle of charging to spectrum used for DAB radio and for local TV broadcasting. Our 2007 statement said AIP should apply after 2014.
- 4.32 In line with our approach for national DTT broadcasting, we will, from the end of 2014, apply charges to DAB radio and Local TV broadcasting to recover our costs of spectrum management. We will consult on the level of these charges during the course of 2013.
- 4.33 We have also considered whether we should set charges above this minimum level to reflect the opportunity cost of the spectrum. However:
- The Analysys Mason study indicates there is no excess demand for spectrum deployed for secondary, interleaved use by local TV. In line with the process set out in the SRSP, AIP is therefore not applicable in this case; and
  - In the spectrum bands assigned for DAB radio, Analysys Mason identified excess capacity at present. The fact that there is excess capacity suggests there is no excess demand for spectrum assigned to DAB services in own use – either currently or following any potential radio digital switchover. In addition we believe that the opportunity cost associated with potential alternative uses is low and possibly zero, largely because the primary allocation of this band to broadcasting across Europe limits the extent to which this band could be put to practical use by other services such as PMR. In accordance with the principles set out in the SRSP, this implies, as for local TV, that AIP is not applicable.
- 4.34 Accordingly, we do not propose to apply AIP to spectrum used for either DAB radio or to local TV from 2014.

## **The potential impact of AIP on DTT broadcast content**

- 4.35 In our 2007 statement, we gave a commitment that we would consider both the potential effects of AIP on broadcast content and the steps available to mitigate those effects before applying AIP – particularly in regard to public service television broadcasting.
- 4.36 We believe this position remains valid for when we consider the imposition of AIP for the use of spectrum for national DTT broadcasting and will consider those implications at the appropriate time.

## **Summary of proposals**

- 4.37 As set out in the preceding paragraphs, we propose:
- To introduce charges for the use of spectrum for broadcasting from the end of 2014.
  - That in relation to use of the spectrum by national DTT, charges will not – for now – be based on opportunity cost. Instead, we propose to apply a regulatory pricing mechanism to recover our on-going costs in managing the spectrum.

- That this pricing regime for the use of spectrum by national DTT will apply until we have materially progressed our proposals for the future use of the UHF spectrum, after which time spectrum charges will be adjusted to AIP, based on the true opportunity cost of the spectrum. We would expect AIP to be in place by around 2020.
- That AIP is not applicable to the use of spectrum by either DAB radio or local TV broadcasting from 2014. Instead, we propose to apply a regulatory pricing mechanism to recover our on-going costs in managing the spectrum.

## Consultation questions

*Question 1: Do you agree that the principle of applying AIP remains relevant to spectrum used for broadcasting?*

*Question 2: Do you agree with our revised proposals to delay the introduction of AIP based on opportunity cost for the use of spectrum by national DTT multiplex operators until we have materially progressed our proposals for the future use of the UHF spectrum?*

*Question 3: Do you agree with our proposals to apply a fee for spectrum used for national DTT, in the meantime, based on recovering our on-going costs in managing the licences?*

*Question 4: Do you agree that charges based on the costs of managing the spectrum should be applied to DAB radio and to local TV broadcasting?*

## Section 5

# Consideration of the level of AIP and the manner of its introduction

- 5.1 As discussed in the previous section, we propose postponing the introduction of AIP to spectrum used for national DTT.
- 5.2 We believe this proposal removes considerable uncertainty for broadcasters in the short term. However, we recognise that uncertainty about the potential level of AIP beyond that date remains. In order to provide some guidance to stakeholders on what the levels of AIP might be, we have considered both the possible level of charges and the manner in which they might be introduced.
- 5.3 While the precise date at which AIP will be introduced may be uncertain, we would expect AIP to be in place by around 2020. We therefore provide here an indication of likely charge levels on the hypothetical basis of charges being introduced in 2020.

## Potential level of AIP after 2020

- 5.4 There is necessarily considerable uncertainty at this point as to what the value of spectrum used for national DTT broadcasting will be seven years from now. To begin with, it is not certain that DTT will be cleared from the 700 MHz band by the hypothetical date of 2020 as assumed in this analysis. In addition, the value of the 700 MHz band will depend on whether it has been internationally harmonised for mobile broadband use. The value of the lower bands used for national DTT broadcasting (i.e. those bands below the cleared 700 MHz band) is likely to depend on the scope for more efficient use of spectrum by broadcasters.
- 5.5 However, despite this uncertainty, we consider it appropriate to set out indicative AIP for DTT spectrum after 2020. In particular, this will help broadcasters to budget for the future introduction of opportunity cost based charges.
- 5.6 Recognising the uncertainties, we have presented an indicative AIP for both a scenario in which national DTT multiplexes continue to use spectrum in the 700 MHz band and one in which they no longer do so. In both cases, we assume that the 700 MHz band has been harmonised for mobile use.
- 5.7 To provide an indication of the likely level of AIP, we have drawn on the work carried out by Analysys Mason under commission by Ofcom. Analysys Mason considered the value of the spectrum both in 'own use' (i.e. for DTT broadcasting) and in 'alternative use' (mobile services).
- 5.8 In assessing the value of the spectrum in own use, Analysys Mason considered a range of alternative means currently available for achieving efficiency gains, including an estimation of the scope for DTT to switch to DVB-T2/MPEG4 transmission. This could, in principle, allow a similar DTT service to be delivered using less spectrum.
- 5.9 At this stage we cannot be certain which options will be available to multiplex operators from the point at which we introduce AIP. There may be scope to deliver

efficiency gains through the use of DVB-T2/MPEG4 – if not already adopted – or through other improved transmission/compression technologies such as HEVC. To give an indication of the possible level of AIP, we have used the Analysys Mason figures based on a switch to DVB-T2/MPEG4, recognising that these figures could in fact be a proxy for an alternative form of efficiency improvement.

- 5.10 Analysys Mason also estimated the value in ‘alternative use’ of DTT spectrum, focusing on the potential use of 700 MHz spectrum for mobile services. Such a measure is relevant if the 700 MHz band is harmonised for mobile use and the national DTT multiplexes continue to operate in this band. We have drawn on these estimates to calculate an indicative AIP in the scenario in which clearance has not occurred by 2020.
- 5.11 Our approach and results are set out in Annex 6. We estimate that, in a scenario in which the national DTT multiplexes are not using spectrum in the 700 MHz band in 2020, the indicative AIP would be around **£10 million** per multiplex per annum.<sup>11</sup> In a scenario in which the national DTT multiplexes continue to use spectrum in the 700 MHz band, AIP would be of the order of **£40 million** per multiplex per annum<sup>12</sup>.
- 5.12 The latter of these estimates is based on an estimate of the network cost savings which mobile operators could achieve by using the 700 MHz band, but not for the commercial value of additional services which could be offered via this band.
- 5.13 More generally, we note that while the indicative AIP set out above reflects our current best estimate of the opportunity cost of the DTT spectrum used for national DTT after 2020, the calculation will need to be reconsidered when we make a decision to introduce AIP at a specific level.

## Manner of introducing AIP

- 5.14 The manner in which AIP will be introduced for spectrum used by national DTT broadcast multiplex operators is also important. When applying AIP charges to other bands of spectrum, we have usually phased in payments over a number of years. This is because the introduction of fees of significant levels over a short period of time raises the chance of a shock, which can lead to inefficient decisions about inputs and outputs, and therefore a sub-optimal use of spectrum.
- 5.15 Consequently, our working hypothesis is that we would adopt a phased approach to the imposition of AIP for spectrum used by national DTT multiplexes, introducing fees gradually from a low level over an extended period. We would expect to introduce AIP over five years from around 2020 so that the full opportunity cost is realised as multiplex operators approach the end of their new licences<sup>13</sup>. However, we will consult more fully on the details of how AIP should be introduced nearer the implementation date.
- 5.16 We will also consider whether there are compelling arguments for differentiating between different types of spectrum use in applying AIP – particularly between PSB and non-PSB services.

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<sup>11</sup> This estimate assumes AIP based on existing use of the band i.e. assuming no alternative higher value use emerges.

<sup>12</sup> These figures are based on Ofcom analysis of calculations by Analysys Mason of the opportunity cost of DTT spectrum from 2014 onward. Our analysis looked at the estimates for 202 onwards, thus our figures are in 2020 prices.

<sup>13</sup> The multiplex licences for Multiplexes B, C and D expire in November 2026.

## Consultation questions

*Question 5: Do you agree that when full AIP is applied for spectrum used for national DTT broadcasting (once we have materially progressed our proposals for future use of the UHF spectrum) it should be applied gradually, rising over five years.*

## Annex 1

# Responding to this consultation

## How to respond

- A1.1 Ofcom invites written views and comments on the issues raised in this document, to be made **by 5pm on 23 May 2013**.
- A1.2 Ofcom strongly prefers to receive responses using the online web form at <http://stakeholders.ofcom.org.uk/consultations/aip13/howtorespond/form>, as this helps us to process the responses quickly and efficiently. We would also be grateful if you could assist us by completing a response cover sheet (see Annex 3), to indicate whether or not there are confidentiality issues. This response coversheet is incorporated into the online web form questionnaire.
- A1.3 For larger consultation responses - particularly those with supporting charts, tables or other data - please email [AIP@ofcom.org.uk](mailto:AIP@ofcom.org.uk) attaching your response in Microsoft Word format, together with a consultation response coversheet.
- A1.4 Responses may alternatively be posted or faxed to the address below, marked with the title of the consultation.
- John Glover  
Senior Policy Advisor  
Spectrum Policy Group  
Riverside House  
2A Southwark Bridge Road  
London SE1 9HA
- Fax: 020 7981 3333
- A1.5 Note that we do not need a hard copy in addition to an electronic version. Ofcom will acknowledge receipt of responses if they are submitted using the online web form but not otherwise.
- A1.6 It would be helpful if your response could include direct answers to the questions asked in this document, which are listed together at Annex 4. It would also help if you can explain why you hold your views and how Ofcom's proposals would impact on you.

## Further information

- A1.7 If you want to discuss the issues and questions raised in this consultation, or need advice on the appropriate form of response, please contact John Glover on 020 7981 3978.

## Confidentiality

- A1.8 We believe it is important for everyone interested in an issue to see the views expressed by consultation respondents. We will therefore usually publish all responses on our website, [www.ofcom.org.uk](http://www.ofcom.org.uk), ideally on receipt. If you think your response should be kept confidential, can you please specify what part or whether

all of your response should be kept confidential, and specify why. Please also place such parts in a separate annex.

- A1.9 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and will try to respect this. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.
- A1.10 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's approach on intellectual property rights is explained further on its website at <http://www.ofcom.org.uk/about/accoun/disclaimer/>

## Next steps

- A1.11 Following the end of the consultation period, Ofcom intends to publish a statement in July/August 2013.
- A1.12 Please note that you can register to receive free mail Updates alerting you to the publications of relevant Ofcom documents. For more details please see: [http://www.ofcom.org.uk/static/subscribe/select\\_list.htm](http://www.ofcom.org.uk/static/subscribe/select_list.htm)

## Ofcom's consultation processes

- A1.13 Ofcom seeks to ensure that responding to a consultation is easy as possible. For more information please see our consultation principles in Annex 2.
- A1.14 If you have any comments or suggestions on how Ofcom conducts its consultations, please call our consultation helpdesk on 020 7981 3003 or e-mail us at [consult@ofcom.org.uk](mailto:consult@ofcom.org.uk) . We would particularly welcome thoughts on how Ofcom could more effectively seek the views of those groups or individuals, such as small businesses or particular types of residential consumers, who are less likely to give their opinions through a formal consultation.
- A1.15 If you would like to discuss these issues or Ofcom's consultation processes more generally you can alternatively contact Graham Howell, who is Ofcom's consultation champion: [graham.howell@ofcom.org.uk](mailto:graham.howell@ofcom.org.uk).

## Annex 2

# Ofcom's consultation principles

A2.1 Ofcom has published the following seven principles that it will follow for each public written consultation:

### Before the consultation

A2.2 Where possible, we will hold informal talks with people and organisations before announcing a big consultation to find out whether we are thinking in the right direction. If we do not have enough time to do this, we will hold an open meeting to explain our proposals shortly after announcing the consultation.

### During the consultation

A2.3 We will be clear about who we are consulting, why, on what questions and for how long.

A2.4 We will make the consultation document as short and simple as possible with a summary of no more than two pages. We will try to make it as easy as possible to give us a written response. If the consultation is complicated, we may provide a shortened Plain English Guide for smaller organisations or individuals who would otherwise not be able to spare the time to share their views.

A2.5 We will consult for up to 10 weeks depending on the potential impact of our proposals.

A2.6 A person within Ofcom will be in charge of making sure we follow our own guidelines and reach out to the largest number of people and organisations interested in the outcome of our decisions. Ofcom's 'Consultation Champion' will also be the main person to contact with views on the way we run our consultations.

A2.7 If we are not able to follow one of these principles, we will explain why.

### After the consultation

A2.8 We think it is important for everyone interested in an issue to see the views of others during a consultation. We would usually publish all the responses we have received on our website. In our statement, we will give reasons for our decisions and will give an account of how the views of those concerned helped shape those decisions.

## Annex 3

# Consultation response cover sheet

- A3.1 In the interests of transparency and good regulatory practice, we will publish all consultation responses in full on our website, [www.ofcom.org.uk](http://www.ofcom.org.uk).
- A3.2 We have produced a coversheet for responses (see below) and would be very grateful if you could send one with your response (this is incorporated into the online web form if you respond in this way). This will speed up our processing of responses, and help to maintain confidentiality where appropriate.
- A3.3 The quality of consultation can be enhanced by publishing responses before the consultation period closes. In particular, this can help those individuals and organisations with limited resources or familiarity with the issues to respond in a more informed way. Therefore Ofcom would encourage respondents to complete their coversheet in a way that allows Ofcom to publish their responses upon receipt, rather than waiting until the consultation period has ended.
- A3.4 We strongly prefer to receive responses via the online web form which incorporates the coversheet. If you are responding via email, post or fax you can download an electronic copy of this coversheet in Word or RTF format from the 'Consultations' section of our website at [www.ofcom.org.uk/consult/](http://www.ofcom.org.uk/consult/).
- A3.5 Please put any parts of your response you consider should be kept confidential in a separate annex to your response and include your reasons why this part of your response should not be published. This can include information such as your personal background and experience. If you want your name, address, other contact details, or job title to remain confidential, please provide them in your cover sheet only, so that we don't have to edit your response.

## Cover sheet for response to an Ofcom consultation

### BASIC DETAILS

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

### CONFIDENTIALITY

Please tick below what part of your response you consider is confidential, giving your reasons why

Nothing

Name/contact details/job title

Whole response

Organisation

Part of the response

If there is no separate annex, which parts?

If you want part of your response, your name or your organisation not to be published, can Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?

### DECLARATION

I confirm that the correspondence supplied with this cover sheet is a formal consultation response that Ofcom can publish. However, in supplying this response, I understand that Ofcom may need to publish all responses, including those which are marked as confidential, in order to meet legal obligations. If I have sent my response by email, Ofcom can disregard any standard e-mail text about not disclosing email contents and attachments.

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Name

Signed (if hard copy)

## Annex 4

# Consultation questions

## Sub heading

- A4.1 The consultation above has identified the following key questions on which we are consulting. Respondents are also welcome to raise other issues on which they would like to comment.

*Question 1: Do you agree that the principle of applying AIP remains relevant to spectrum used for broadcasting?*

*Question 2: Do you agree with our revised proposals to delay the introduction of AIP based on opportunity cost for national DTT multiplex operators until we have materially progressed our proposals for the future use of the UHF spectrum?*

*Question 3: Do you agree with our proposals to apply a fee for spectrum used for national DTT, in the meantime, based on the cost of administration instead?*

*Question 4: Do you agree that charges based on the costs of managing the spectrum should be applied to DAB radio and to local TV broadcasting?*

*Question 5: Do you agree that when full AIP is applied for spectrum used for national DTT broadcasting (once we have materially progressed our proposals for future use of the UHF spectrum) it should be applied gradually, rising over five years.*

## Annex 5

# Legal framework

A5.1 The legal framework within which we operate is set out in the Communications Act 2003 (the 'Act'), the Wireless Telegraphy Act 2006 (the 'WT Act') and applicable EU directives, including the Authorisation Directive<sup>14</sup> and the Framework Directive<sup>15</sup>.

## The duties imposed by the Communications Act 2003

A5.2 Section 3 of the Communications Act 2003 provides that our principal duties are:

- to further the interests of citizens in relation to communications matters; and
- to further the interests of consumers in relevant markets, where appropriate, by promoting competition.

A5.3 In securing the above duties, we are required to secure among other things the optimal use for wireless telegraphy of the electromagnetic spectrum and the availability throughout the UK of a wide range of electronic communication services and to have regard to the different needs and interests of everyone who may wish to use the spectrum for wireless telegraphy.

A5.4 Section 3(2)(c) of the Act sets out the requirement to secure the availability throughout the United Kingdom of a wide range of television and radio services. Section 3(4)(a) requires us to have regard to the desirability of promoting the fulfilment of the purposes of public service television broadcasting in the United Kingdom.

A5.5 Section 3(3) of the Communications Act provides that in performing our principal duties, we must in all cases have regard to the principles of transparency, accountability, proportionality and consistency as well as ensure that our actions are targeted only at cases in which action is needed.

A5.6 Section 3(4) of the Communications Act requires us in performing our principal duties to have regard to a number of factors as appropriate, including the desirability of promoting competition, encouraging investment and innovation in relevant markets and encouraging the availability and use of high-speed data-transfer services throughout the UK.

## Our duties when carrying out our spectrum functions

A5.7 In carrying out our spectrum functions, we have a duty (under Section 3 of the Wireless Telegraphy Act 2006) to have regard in particular to:

- the extent to which the spectrum is available for use or further use for wireless telegraphy;

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<sup>14</sup> Directive 2002/20/EC on the authorisation of electronic communications networks and services, as amended by Directive 2009/140/EC

<sup>15</sup> Directive 2002/21/EC on a common regulatory framework for electronic communications networks and services, as amended by Directive 2009/140/EC.

- the demand for use of that spectrum for wireless telegraphy; and
- the demand that is likely to arise in future for the use of that spectrum for wireless telegraphy.

A5.8 We also have a duty to have regard, in particular, to the desirability of promoting:

- the efficient management and use of the spectrum for wireless telegraphy;
- the economic and other benefits that may arise from the use of wireless telegraphy;
- the development of innovative services; and
- competition in the provision of electronic communications services.

A5.9 Where it appears to us that any of our duties in Section 3 of the Wireless Telegraphy Act conflict with one or more of our general duties under Sections 3 to 6 of the Communications Act, priority must be given to our duties under the latter.

## **Spectrum fees and our duties concerning spectrum management**

A5.10 We apply AIP where appropriate to secure optimal use of the radio spectrum and set fees for licences<sup>16</sup> and grants of recognised spectrum access with that objective in mind. The following paragraphs discuss our general approach to deciding when to apply AIP as opposed to charging cost-based fees.

A5.11 The Authorisation Directive states in Article 13 that Member States may impose fees for the rights of use of radio frequencies which reflect the need to ensure the optimal use of that resource. The WT Act, therefore, permits us to recover sums greater than those necessary to recover the costs incurred in connection with our radio spectrum functions. If we do so, we are required to have regard, in particular, to:

- the extent to which the spectrum is available;
- present and likely future demand;
- the desirability of promoting:
  - efficient management and use of the spectrum;
  - economic and other benefits;
  - innovation; and
  - competition<sup>17</sup>.

<sup>16</sup> Installation or use of radio equipment is unlawful unless under, and in accordance with, a licence granted by Ofcom (see s. 8(1) of the WT Act). This does not apply to Crown bodies, which do not require a licence from us for their use of spectrum. However, the Secretary of State may make payments to Ofcom in respect of the use of spectrum by Crown bodies (s. 28 of the WT Act). Additionally, a licence is not required also where the use of spectrum is exempted from this requirement by regulations. Equipment that is unlikely to cause interference, such as short-range devices or receivers, must be exempted from licensing under s. 8(4) of the WT Act. Therefore, no fee is payable to access the spectrum by means of such equipment, unless under a grant of recognised spectrum access, as explained in the following footnote

<sup>17</sup> Section 13 of the WT Act

- A5.12 We are also required to have regard to our general duties and the Community requirements set out in sections 3 and 4 of the Act respectively<sup>18</sup>. The Authorisation Directive<sup>19</sup> also requires fees for rights to use spectrum to be objectively justified, transparent, non-discriminatory and proportionate.
- A5.13 The fees for most licences are set out in specific regulations. The current regulations are the Wireless Telegraphy (Licence Charges) Regulations 2011 (SI 2011/1128).

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<sup>18</sup> In case of conflicting duties, priority must be given to the Community requirements over the general duties set out in section 3 of the Act and these latter take precedence over the duties set out in section 3 of the WT Act, which concern more specifically the management of the radio spectrum.

<sup>19</sup>Article 13 of the Authorisation Directive, which also specifies that Member States shall take into account the objectives set out in Article 8 of the Framework Directive 2002/21/EC (the Framework Directive) in setting fees.

## Annex 6

# Indicative AIP for future DTT spectrum use

## Our approach

A6.1 We have calculated an indicative figure of AIP for the spectrum used by the national DTT multiplexes based upon two possible scenarios:

- The 700 MHz spectrum is harmonised for mobile use and the national DTT multiplexes are cleared from, or choose to vacate, 700 MHz spectrum (referred to as 700 MHz clearance below); and
- The 700 MHz spectrum is harmonised for mobile use and the national DTT multiplexes continue to operate using 700 MHz spectrum (referred to as non-clearance below).

A6.2 Four spectrum bands are relevant to the calculation of AIP for DTT spectrum:

- Channels 21-30 (comprising 80 MHz of spectrum), referred to here as the First band, currently used as part of the DTT multi-frequency network (MFN) and expected to be used for the same purpose after 700 MHz clearance;
- Channels 31-37 (56 MHz), known as the 600 MHz band. We plan to award a licence for interim (pre-clearance) use of this band for DTT use, which will not be subject to AIP. However it is expected that this band will be part of the DTT MFN after 700 MHz clearance, and subject to AIP at that point.<sup>20</sup>
- Channels 39-48 (80 MHz), referred to here as the Third band, currently part of the DTT MFN and expected to be used for this purpose after 700 MHz clearance.
- Channels 49-60 (96 MHz), known as the 700 MHz band, currently used as part of the DTT MFN. Following 700 MHz clearance it would instead be used for mobile broadband.

In a post-clearance scenario, the DTT MFN would use the First, 600 MHz, and Third bands; and in a non-clearance scenario the DTT MFN continues to use the First, Third and 700 MHz bands but would not use the 600 MHz band (which would continue in its interim use).

## Post-clearance scenario

A6.3 If we were to charge AIP for DTT broadcasting following 700 MHz clearance we would need to determine the opportunity cost of spectrum in the First, 600 MHz, and Third bands.

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<sup>20</sup> We are consulting on our view that AIP should not be charged for the interim use of the 600 MHz band (paragraphs 5.34-5.39, Award of the 600 MHz spectrum band, February 2013, <http://stakeholders.ofcom.org.uk/binaries/consultations/600mhz-award/summary/condoc.pdf>). This is because our UHF Strategy Statement has determined that the interim licensed use of the spectrum should be for DTT using DVB-T2 and MPEG4, and the licence holder cannot reasonably be expected to respond to long-term efficiency signals within a short-term licence period. These arguments would not apply in a post-clearance scenario in which 600 MHz spectrum were part of the DTT MFN.

- A6.4 To provide an indication of the likely level of AIP, we have drawn on the analysis carried out by Analysys Mason. Analysys Mason presents four valuation methods, of which the most relevant here is one based on the idea that DTT might switch to DVB-T2/MPEG4 in order to use the spectrum more efficiently.
- A6.5 As noted in Section 4, it is possible that DTT may switch to DVB-T2/MPEG4 before or during 700 MHz clearance, but we consider that this part of Analysys Mason's model can provide an indication of likely AIP at that point, as other improved transmission/compression technologies may subsequently become available, creating scope for an improvement in efficiency of spectrum use broadly comparable to that which DVB-T2/MPEG 4 would allow.
- A6.6 Analysys Mason bases its analysis on current DTT spectrum use – i.e. of the First, Third and 700 MHz bands. Its approach is to consider:
- (a) the costs of introducing DVB-T2/MPEG4, which primarily comprise the costs of upgrades to households' DTT receivers and a publicity campaign, and
  - (b) the costs associated with switching off transmission in one of the bands; these costs primarily relate to upgrades to wideband aerials, including publicity costs, for households who would need new aerials to continue receiving a DTT signal.
- A6.7 In Analysys Mason's model the costs in (a) are fixed regardless of which band is released;<sup>21</sup> those in (b) vary according to which band is released.
- A6.8 We have used Analysys Mason's results to inform our own analysis as follows:
- To reflect the post-clearance situation, we remove the 700 MHz band from the calculations, and estimate instead the value of spectrum in the 600 MHz band.
  - Analysys Mason sets out the cost of clearing each band in turn, sums all of these costs across bands, and divides by the total MHz used by DTT to derive an average per-MHz opportunity cost. We consider that it would be more realistic to expect that if DTT broadcasters were to introduce a more capacity-efficient technology, such as DVB-T2/MPEG4 (alongside re-planning) they would seek to release spectrum in the band where the costs (per MHz released) of doing so were lowest. Variations in cost/MHz between bands occur because:
    - a) Of the three bands in question, the First and Third have 80 MHz each, while the 600 MHz band has only 56 MHz. This means that for costs that (in Analysys Mason's model) are the same regardless of which band is released – e.g. publicity costs – the cost per MHz of releasing a smaller band will be higher.<sup>22</sup>

<sup>21</sup> The publicity costs are associated with informing affected DTT households of the changes to the platform. This cost is based upon the equivalent TV DSO costs of running Digital UK and does not vary across bands since CPE replacement does not vary across bands.

<sup>22</sup> For example publicity costs are around £150 million, regardless of the band released. Analysys Mason's approach is to add these to the cost of releasing each band, and then averaging. In this treatment, publicity costs are around £2.1 million per MHz NPV (= £150 x 3 / 216 MHz), adding £5.4 million/mux/annum to the AIP, while in our approach, taking the case of releasing the 600 MHz band, publicity costs would be around £2.7 million per MHz NPV (= 150 / 56 MHz), adding £6.9 million/mux/annum to the indicative AIP.

- b) Wideband aerial upgrade costs vary considerably between bands. In the case of the 600 MHz band these costs are very low, because any households already receiving DTT in the 600 MHz range would have needed to install a wideband aerial following 700 MHz clearance, if they did not already have one.
- For a given band release, only a proportion of households who had been receiving DTT in that frequency range would need to upgrade aerials. Others would have wideband aerials, or older aerials which they could nevertheless use to receive signals in adjacent bands. The extent to which older aerials could be used in this way depends on the “overlap” between the frequencies those aerials can receive, and the frequencies being used for DTT following the release of a band. This has a significant impact on the aerial upgrade costs associated with releasing different bands of spectrum, and hence on the indicative AIP.
- Post clearance, the fact that DTT would use the 600 MHz band but not the 700 MHz band hypothetically affects the extent of aerial upgrades needed as follows:
  - c) Release of the First band would require *fewer* upgrades than in Analysys Mason’s estimates because some households could receive signals in the 600 MHz range;
  - d) Release of the 600 MHz band would require *very few* upgrades because most households would have wideband aerials already;
  - e) Release of the Third band would require *more* upgrades than in Analysys Mason’s estimates because households would no longer be able to receive signals in the 700 MHz range.
- We have also considered two further adjustments to Analysys Mason’s figures:
  - f) We model an increase in the penetration of wideband aerials by 2020, which reduces costs particularly in the First and Third bands. Current evidence suggests an aerial replacement rate of around 4% per annum, with most new aerials being wideband.
  - g) We also modelled an increase in the penetration of T2 receivers by 2020, which will decrease the fixed cost of upgrading consumer equipment.
- While the second of these adjustments is relevant to the opportunity cost associated with a switch to DVB-T2/MPEG4, we consider it is less likely to be relevant to other potential transmission / compression technologies which may be available in 2020. We therefore present figures based only on the first of these adjustments.

A6.9 Taking these adjustments into account, we find that the cheapest hypothetical option would be to release the First band, and this approach is consistent with an indicative AIP of around £10 million per multiplex per annum. In fact, the indicative AIP does not vary greatly depending on which band is released (N.B. this is a hypothetical case for the purpose of calculating AIP rather than signalling any future policy on further spectrum release post any 700 MHz clearance).

## Non-clearance scenario

A6.10 In the absence of 700 MHz clearance by 2020, the DTT MFN would continue to use the First band, the Third band, and the 700 MHz band.<sup>23</sup> We consider that in this case the most relevant measure of the opportunity cost of the 700 MHz band would be its value to a mobile operator, rather than the cost to DTT of switching to a more efficient technology and releasing spectrum, which formed the basis of our calculations above. Analysys Mason notes that the 700 MHz band would only be of significant value to mobile operators if it were harmonised for mobile services, and therefore models mobile use in the harmonised band; we follow the same approach.

A6.11 In assessing an indicative AIP in this scenario:

- We first consider what the methodology set out above – i.e. based on Analysys Mason’s modelling of a switch to a more efficient technology<sup>24</sup> – would suggest, if applied to the First and Third bands only;
- We set out Analysys Mason’s estimates of the opportunity cost of the 700 MHz band based on use of this band by a mobile operator;
- We then consider how these two estimates could be used to derive an indicative AIP.

### ‘Switch to a more efficient technology’ methodology applied to First / Third bands

A6.12 Analysys Mason’s model finds that the costs of releasing the Third band would be substantially lower than the costs of releasing the First band in a non-clearance scenario, particularly because a substantial number of households could receive DTT in 700 MHz if the Third band were switched off. Applying our further adjustment – based on increased penetration of wideband aerials, would generate an AIP of around £7 million per multiplex per annum for use of the First and Third bands.

### Analysys Mason’s estimates of the value of 700 MHz band to mobile broadband

A6.13 Analysys Mason estimates the opportunity cost for DTT spectrum in the 700 MHz band in mobile use at £1.3 million per MHz per annum in 2014.<sup>25</sup> This is based on an assumption that 2x40 MHz of paired spectrum, i.e. 80 MHz of spectrum,<sup>26</sup> would be available for mobile use, giving a total value for the 700 MHz band of £106.4 million, or £17.7 million per multiplex per annum. The equivalent value for 2020 is around £32 million per multiplex per annum.<sup>27</sup>

A6.14 Analysys Mason’s estimate takes account only of the network cost savings resulting from access to the spectrum, although Analysys Mason also notes that there is likely to be an additional commercial value arising from additional revenue streams and non-network cost savings due to having access to the spectrum.

<sup>23</sup> Inclusion of the 600 MHz band in the DTT MFN is expected to occur as part of 700 MHz clearance, and therefore in the absence of clearance, we expect that 600 MHz spectrum would not form part of the DTT MFN, but would continue in its interim DTT use.

<sup>24</sup> But, as noted, also potentially relevant to other improvements in efficiency of spectrum use, such as those resulting from a switch to HEVC.

<sup>25</sup> Our internal analysis of 4G auctions in comparable European countries (Germany, Italy, France and Spain) suggests a value of £2.1 million to £3.2 million per MHz per annum for 800 MHz spectrum.

<sup>26</sup> This is less than the total 96 MHz in the 700 MHz band due to the need for guard bands etc.

<sup>27</sup> Essentially Analysys Mason calculated the net present value, in 2014, of a release of the 700 MHz band for mobile in 2020. The net present value would be higher if calculated in 2020, as the value of 700 MHz release would no longer be deferred to a future date.

- A6.15 The figure of £32 million here is based on value alternative use only. In practice when setting AIP we would have regard to both existing use and alternative use<sup>28</sup>. Having regard to the (lower) value of 700 MHz in existing use would tend to reduce the figure below £32 million (other things being equal), although the extent of this would depend on how much weight we put on this relative to the value in alternative use.
- A6.16 We also note that there are other factors which might increase the figure above £32 million. In particular, the valuations by Analysys Mason on which this figure is based reflect network cost savings only, but there may be other elements of value to a mobile broadband provider (such as the ability to provide additional services or reach more customers) which would tend to increase the value in alternative use.

*Combining Analysys Mason's methodologies for the First/Third and 700 MHz bands*

- A6.17 We consider it would be appropriate to combine these two methodologies by:
- h) Applying AIP for use of the First and Third bands based on the cost of switching to DVB-T2/MPEG4, i.e. at around £7 million per multiplex per annum; and
  - i) Applying AIP for use of the 700 MHz band based on the value of that spectrum for mobile broadband, i.e. at around £32 million per multiplex per annum.
- A6.18 This approach effectively considers DTT use of 700 MHz spectrum as separate from DTT use of the First and Third bands. We consider that this approach may be an appropriate way of reflecting the substantial difference in opportunity cost between the 700 MHz band and the lower bands.
- A6.19 Since, in the absence of clearance, DTT would continue to use all three bands, the total indicative AIP would be in the order of £40 million per multiplex per annum.

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<sup>28</sup> Ofcom's approach to setting reference rates for AIP is described in our 2010 consultation *SRSP: The revised Framework for Spectrum Pricing*. There we note (paragraph 4.17) that "if there is a higher value feasible alternative use, we set the reference rate at a point between the two values [i.e. of existing and alternative use], dependent on the perceived relative risks of setting the fee too high, or too low". We also note (paragraphs 3.120) that "if the value of feasible alternative use is much higher than the value of current use, then the potential loss from setting fees too low (delaying or keeping out the higher value use) is more likely to be higher than the potential loss from setting fees too high" and (paragraph 3.121) that "this would mean placing greater weight on the estimated value of spectrum in feasible alternative uses than has hitherto been the case".

## Annex 7

# Glossary of terms

**AIP** - Administered Incentive Pricing

A mechanism for pricing spectrum based on the opportunity cost of its use (i.e. its value in the next most valuable use).

**DAB** – Digital Audio Broadcasting

A digital radio technology for broadcasting radio stations.

**DDR** - Digital Dividend Review

Ofcom's programme of work which examined uses for the frequency spectrum released by digital switchover. This is known as the released spectrum, or digital dividend spectrum.

**DSO** - Digital Switchover

The process of transitioning from analogue broadcasting to fully digital broadcasting. Television DSO in the UK was completed during 2012.

**DTT** - Digital Terrestrial Television

Any form of Terrestrial Television broadcasting delivered by digital means. In the UK and Europe, DTT transmissions use the international DVB-T and DVB-T2 technical standards.

**DVB-T2**

An advanced digital terrestrial transmission technology developed by DVB. DVB-T2 technology is more efficient than the original DVB-T standard, and is used to deliver high definition TV services on DTT in the UK,

**FTA** - Free-to-air

Broadcast content that is unencrypted, and which can be accessed without subscription or the use of conditional access (scrambling) systems.

**HEVC** – High Efficiency Video Coding

A proposed video compression standard, still under development. It is seen as a likely successor to MPEG-4 video coding

**HDTV** - High Definition TV

A television or other video service with at least 720 lines of vertical resolution. This higher resolution picture raster can provide enhanced quality and more detailed pictures, particularly on larger displays.

**IPTV** – Internet Protocol Television

A system for delivering television services via the internet instead of being delivered through terrestrial, satellite or cable networks.

**MFN** – Multi-frequency network

The simultaneous transmission of the same television signals on different frequencies in different parts of the country

**MHz** - Megahertz.

A unit of frequency of one million cycles per second.

**MPEG** - Moving Picture Experts Group

A body which develops technical standards for the compression of digital audio-visual content. Most UK standard definition digital television services use MPEG-2 video compression. The more recent MPEG-4 AVC (H.264) video compression offers greater efficiency than MPEG-2.

**Multiplex**

In digital TV broadcasting, a single physical layer signal which contains, when decoded, multiple discrete streams of digital information (including video and audio streams). Individual components of the multiplex are decoded at the receiver in order to present the desired TV service to the viewer.

**PMR** – Private Mobile Radio

PMR - sometimes called Professional Mobile Radio - was developed for business users who need to keep in contact over relatively short distances with a central base station e.g. a taxi company. Such a system serves a closed user group and that is normally owned and operated by the same organization as its users.

**PSB** - Public Service Broadcasting or Public Service Broadcaster.

**SDTV** - Standard Definition TV

The lower, and currently most common, of the picture resolutions used for television broadcasting. Standard definition TV services in the UK and Europe have a vertical resolution of 576 (interlaced) lines.

**SFN** - Single Frequency Network

A network of transmitter sites in which each transmitter uses the same frequency as its neighbours.

**SRSP** – Strategic Review of Spectrum Pricing

Ofcom's 2010 review of the way charges for spectrum use should be applied

**UHF** - Ultra-High Frequency

The frequency range from 300 MHz to 1000 MHz. Terrestrial TV broadcasting in the UK uses UHF frequencies between 470 MHz and 790 MHz.

**WRC** - ITU World Radio-communications Conference

WRC reviews and revises the ITU Radio Regulations. Conferences are held every two to three years.